

B3  
SUBC  
said carbon atoms comprising at least 98.5 weight % of said fiber aggregate;  
wherein said nanotubes are tube-shaped.

### REMARKS

Reconsideration of this application as amended is respectfully requested.

#### **I. Status of the Claims**

Claims 1 - 9 are pending in this application.

Claims 1 - 9 stand rejected.

Claims 10 - 12 are cancelled.

#### **II. Response to Restriction Requirement Traversal**

The Examiner has considered the traverse of the Restriction Requirement entered in the Response of October 15, 2002, and the Restriction was made final based on a burden of search.

#### **III. Rejections Under 35 U.S.C. § 102(b)**

Claims 1 - 9 stand rejected under 35 U.S.C. 102(b) as being anticipated by Jose-Yacaman et al., Appl. Phys. Lett. 1993 (hereinafter "Jose-Yacaman") with Ohta et al., U.S. Patent No. 5,489,477 (hereinafter "Ohta"), and Nolan et al., U.S. Patent No. 5,965,267 (hereinafter "Nolan") cited for inherent properties. The Examiner states that Jose-Yacaman discloses carbon nanotubes of rolled graphitic planes, which are compared to the Iijima Nature (1991) product. The Examiner also states that the fiber of Jose-Yacaman contains hydrogen based on the disclosure of Nolan. The Examiner acknowledges that the nanotubes of Jose-Yacaman are spiral.

Claims 1 - 2 stand rejected under 35 U.S.C. 102(b) as being anticipated by Ohta with Nolan cited for inherent properties. The Examiner states that Ohta discloses generally cylindrical structures, which have a diameter within the claimed range based on C-C bond

lengths. The Examiner states that Nolan discloses that hydrogen is inherently present in such structures.

Claims 1 - 9 stand rejected under 35 U.S.C. 102(b) as being anticipated by Endo et al., J. Phys. Chem. Solids 1993;54(12):1841-1848 (hereinafter "Endo"). The Examiner states that Endo discloses a hollow nanotube having the claimed diameters; and that this nanotube contains hydrogen based on Nolan. The Examiner also states that Fig. 3 shows aggregates made from an iron catalyst. The Examiner takes official notice that 0.1% hydrogen is a trace impurity amount.

The Applicant respectfully traverses the above rejections by stating that neither Jose-Yacaman, Ohta nor Endo teach or suggest all of the claimed elements of the present invention. The claims have been amended to add the limitations that the carbonaceous nanotube comprises disordered, layers of carbon material that include hydrogen. This provides a unique combination of structure, wettability, and chemical reactivity. Support for the added limitations can be found in the specification at page 8, lines 10 - 13.

Jose-Yacaman discloses two types of nanotubes. One type is the rolled graphitic sheet of Iijima, produced by the arc-discharge method. The second type is produced by catalytic methods using acetylene. Both types of nanotubes disclosed in Jose-Yacaman are spiral tubes. The nanotubes used in Ohta are produced by the arc-discharge method of Iijima and, therefore, are also spiral. Col. 5, ll. 38-50. A spiral tube does not have layers because it is a continuous, rolled plane. The nanotubes of the present invention has layers because in cross-section it is composed of concentric rings that are distinct layers.

Additionally, Nolan discloses that hydrogen is present in the catalytically nanotubes of Jose-Yacaman. Col. 1, ll. 63-67, col. 2, ll. 1-6. Nolan presupposes that the structure has "exposed carbon lattice edges" that are "capped by hydrogen atoms". Col. 1, ll. 47-53, col. 2, ll.

2-6. This is an ordered structure. While the presupposition applies to Jose-Yacaman tubes, the nanotubes of the present invention do not have exposed edges because the nanotubes are composed of rings. Moreover, the nanotubes of the present invention do not have lattice edges because the carbon material is disordered and, therefore, not a lattice.


The nanotubes of the present invention are not anticipated by Endo because the Endo tubes have a lattice and are not disordered, p. 1845. Additionally, as noted above, Nolan is not applicable because there is no lattice edge available for hydrogen capping in the nanotube of the present invention. The disordered construction is an important characteristic of the nanotubes of the present invention as it results in increased wettability, p. 8, ll.10-15.

### CONCLUSION

In view of the foregoing, the Applicant respectfully requests the withdrawal of the above rejections. It is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

Respectfully submitted,

  
\_\_\_\_\_  
Joseph R. Robinson  
Reg. No. 33,448  
Attorney for Applicant

DARBY & DARBY, P.C.  
Post Office Box 5257  
New York, N.Y. 10150-5257  
Phone (212) 527-7700

Serial No. 09/615,104  
Response to Final Office Action

M:\9496\01410\PMZ0146.DOC

Docket No. 9496/0L410  
Page 5



CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper or, if this paper is a transmittal letter, every other paper or fee referred to therein, is being facsimile transferred to the Commissioner for Patents & Trademarks at the United States Patent and Trademark Office, Washington, DC 20231, on the date shown below.

\_\_\_\_ (Date of Transmission)

Date \_\_\_\_\_ Name \_\_\_\_\_

Signature \_\_\_\_\_

Customer No.: 07278

Patent Trademark Office

PLEASE CHARGE ANY DEFICIENCY UP TO \$300.00 OR CREDIT ANY EXCESS IN THE FEES DUE WITH THIS DOCUMENT TO OUR DEPOSIT ACCOUNT NO. 04 - 0100

EXPRESS MAIL CERTIFICATE

Date 4/8/03 Label No. EV294037784 US

I hereby certify that, on the date indicated above, this paper or fee was deposited with the U.S. Postal Service & that it was addressed for delivery to the Assistant Commissioner for Patents, Washington, DC 20231 by "Express Mail Post Office to Addressee" service.

A. Stantini A. Stantini

Name (Print)

Docket No. 949601410-US0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Takashi OHSAKI

Serial No.: 09/615,104

Art Unit: 1754

Filed: July 13, 2000

Examiner: Stuart L. HENDRICKSON

For: **CARBONACEOUS NANOTUBE, NANOTUBE AGGREGATE, METHOD FOR MANUFACTURING A CARBONACEOUS NANOTUBE**

MARK-UP FOR AMENDMENT OF APRIL 7, 2003

Hon. Commissioner of  
Patents and Trademarks  
Washington, DC 20231

April 7, 2003

Sir:

Pursuant to 37 C.F.R. §1.121, applicants provide the following mark-up copy of the amended claims in the above-referenced application.

IN THE CLAIMS

1. (Twice Amended) A carbonaceous hollow nanotube comprising:

a plurality of disordered layers comprising a carbon material said carbon material comprising hydrogen atoms and carbon atoms; and having an inner diameter less than or

equal to 5nm; and an outer diameter wherein the difference between said outer diameter and said inner diameter is equal to or less than 20nm;

[said carbon material comprising hydrogen atoms and carbon atoms;]

wherein said nanotube is tube-shaped.

3. (Amended) The carbonaceous nanotube according to claim 1,  
wherein said carbon nanotube further comprises[ing] at least one transition metal atom.

5. (Twice Amended) A fiber aggregate, comprising: carbonaceous hollow nanotubes comprising a plurality of disordered layers comprising a carbon material and having an inner diameter of less than or equal to 5nm; and an outer diameter wherein the difference between said outer diameter and said inner diameter is equal to or less than 20nm;  
said carbon material comprising hydrogen atoms and carbon atoms;  
said carbonaceous nanotubes comprising at least 70 weight % of said fiber aggregate;  
said hydrogen atoms comprising 0.1 to 1 weight % of said fiber aggregate; and  
said carbon atoms comprising at least 98.5 weight % of said fiber aggregate; wherein said nanotubes are tube-shaped.